

U.S. Patent Application No. 10/621,096
Amendment dated June 21, 2005
Reply to Office Action of March 21, 2005

REMARKS/ARGUMENTS

Claims 1-28, 32 and 34-43 are now pending in the application. Claims 29-31 and 33 were withdrawn as a result of a restriction requirement. At page 2 of the Office Action, the Examiner sets forth the reasons for the Restriction Requirement, which separated the pending claims into two groups. According to the Examiner, claims 1-28, 32, and 34-38 (Group I) are drawn to a monolithic sputtering target assembly, and claims 29-31, and 33 (Group II) are drawn to a method of doing business.

The applicants affirm the election of Group I. The applicants believe that the remaining claims, namely claims 29-31, and 33 could have been examined at this time given that it appears that no serious burden on the Examiner would exist to also examine these claims. However, in view of co-pending Application No. 10/274,815, these claims have been canceled. Claim 1 has been amended to include the subject matter of claim 7. Claim 7 has also be canceled and claims 37 and 38 have been amended to become independent claims.

Newly added claim 39 finds support in the specification at page 13, lines 1-3. New claims 40-43 are similar to claims 2 and 3 except for their dependency. Accordingly, full support exists and no questions of new matter are raised by this amendment. Entry of this amendment is respectfully requested.

At page 3 of the Office Action, the Examiner has objected to the specification because the last word on page 11, line 2 is not clear. The Examiner has requested the submission of a new paragraph.

The paragraph has been resubmitted as requested. This amendment is purely editorial in nature. The word "this" was not completely visible in the specification submitted to the Patent Office due to a copying error. Accordingly, no questions of new matter should be raised by this

U.S. Patent Application No. 10/621,096
Amendment dated June 21, 2005
Reply to Office Action of March 21, 2005

amendment, and entry is respectfully requested.

At page 3 of the Office Action, claim 10 has been rejected under 35 U.S.C. §112, second paragraph, as indefinite. The Examiner asserts that the limitation "said at least a portion of said backing plate portion" has an insufficient antecedent basis. At page 3, the Examiner suggests amending claim 10 to depend upon claim 9, instead of claim 7, to overcome this rejection. For the following reasons, this rejection is respectfully traversed.

Claim 10 has been amended to now depend upon claim 9 instead of claim 7, as suggested by the Examiner in the Office Action. The scope of the claim remains the same. It is respectfully requested that this rejection be withdrawn.

At page 4 of the Office Action, claims 1-6, 12, and 16-18 have been rejected under 35 USC §102(b) as anticipated by Dunlop et al. (U.S. Patent No. 5,809,393). While the Examiner has found that Dunlop et al. only teaches sputtering targets and methods of making sputtering targets, the Examiner asserts them to be monolithic because there is no teaching of a backing plate, so the entire sputtering target assembly is asserted to be subject to sputtering. Since the entire target is subject to sputtering, the Examiner asserts that it is a monolithic sputtering target assembly as recited in claim 1. For the following reasons, this rejection is respectfully traversed.

Claim 1 recites a "monolithic sputtering target assembly," wherein the one piece assembly comprises a sputtering target blank portion and a backing plate portion. Monolithic in this context indicates that the entire sputtering target assembly is fashioned from a single material. The term "assembly" in claim 1 indicates a backing plate portion and a target portion.

Dunlop et al. envisions the use of sputtering targets in various sputtering assemblies and sputtering apparatus which are not expressly described in Dunlop et al. At col. 1, lines 29-42, of Dunlop et al., it is explained that the described sputtering targets are to be used in various

U.S. Patent Application No. 10/621,096
Amendment dated June 21, 2005
Reply to Office Action of March 21, 2005

sputtering assemblies and apparatus which are taught in other cited references, and that are incorporated by reference into Dunlop et al. It is clear that in Dunlop et al., the targets are not to be used by themselves, but are to be used in various sputtering assemblies that are known in the art. Dunlop et al., at col. 5, lines 24-26, even refers to the target as a target blank. The sputtering targets described in Dunlop et al. are not monolithic assemblies but are, in fact, simply the targets which are to ultimately form a part of a sputtering target assembly.

Therefore, Dunlop et al. does not anticipate claim 1, since claim 1 specifically recites a "monolithic sputtering target assembly." It is respectfully requested that this rejection be withdrawn.

At page 5 of the Office Action, claims 1, 5, and 13-15 have been rejected under 35 U.S.C. §102(e) as anticipated by Turner (U.S. Patent Appl. Publication No. 2004/0119131 A1). The Examiner asserts that Turner teaches a monolithic sputtering target material with an average grain size of 8.8 microns. For the following reasons, this rejection is respectfully traversed.

Turner relates to sputtering targets that contain titanium and zirconium alloys. Turner contains no teaching or suggestion of the use of any other metal in sputtering targets. Turner is very similar to Dunlop et al. in that the patent application describes a target and there is no teaching or suggestion of a monolithic target assembly as that term is used in the present application. Clearly, the target material of Turner is intended to be used with a conventional target assembly which includes a backing plate. Accordingly, since Turner does not teach or suggest the monolithic sputtering target assembly, which comprises a one piece assembly made from the same material wherein the one piece comprises a sputtering target blank portion and a backing plate portion, this rejection should be withdrawn.

At page 5 of the Office Action, claims 1-3, 5-8, 11, 12, and 19-23 have been rejected

U.S. Patent Application No. 10/621,096
Amendment dated June 21, 2005
Reply to Office Action of March 21, 2005

under 35 U.S.C. §103(a) as unpatentable over Buehler (U.S. Patent No. 6,503,380 B1) in view of Nakamori et al. (U.S. Patent No. 4,849,605). The Examiner asserts that Buehler teaches a sputtering target comprising a backing plate with a flange, which further comprises an electrically conductive material. The Examiner states that Buehler does not teach a sputtering target and backing plate to be from the same metal. The Examiner further asserts that Nakamori et al. teaches that tantalum and niobium are metals, and that they are conductive, and that they can be sputtered from a target. The Examiner then states that it would be obvious to modify Buehler to utilize tantalum or niobium as the sputtering target and backing plate because they are metals and they are conductive. For the following reasons, this rejection is respectfully traversed.

Claim 1 recites a monolithic sputtering assembly made from the same metal. As discussed in the present specification, a monolithic sputtering target assembly has a one piece assembly, made entirely from the same material. See e.g., specification, page 5, lines 12-14. The term "monolithic" is with reference to the sputtering target assembly made from a single piece with no joints or seams in the target assembly.

From a review of Buehler, the applicants did not see any teaching or suggestion of a monolithic assembly nor did the applicants see any teaching or suggestion regarding the use of a target portion and a backing plate portion that can be the same material. To the contrary, Buehler does not apparently indicate that the same materials are used. In the one example mentioned in Buehler at col. 3, copper is identified as the backing plate, while titanium is identified as the preferred target material. Clearly, this teaches away from the claimed invention, which relates to monolithic target assemblies, and, therefore, is different on this aspect alone, and, further, Buehler does not even teach or suggest using the same materials for the backing plate or target. Nakamori et al. does not relate to sputtering targets per se. Nakamori et al. merely relates to the

U.S. Patent Application No. 10/621,096
Amendment dated June 21, 2005
Reply to Office Action of March 21, 2005

formation of heating resistors by sputtering a target. Thus, Nakamori et al. does not provide any details regarding the target assembly other than indicating the target source for purposes of forming the resistor layers. Accordingly, Nakamori et al. does not solve any of the serious deficiencies of Buehler since Nakamori et al. does not teach or suggest a monolithic target assembly and only recites source materials for the layers on a heating resistor.

The combination of Buehler and Nakamori et al. would not suggest a monolithic target assembly. Buehler and Nakamori et al. both relate to conventional sputtering target assemblies made from separate pieces, that are bonded together using conventional methods. For example, Buehler states that the backing plate "can be joined to target 102 utilizing conventional methods, such as, for example, a solder bond." See Buehler, col. 3, lines 15-17.

The combination of Buehler and Nakamori et al. do not teach all of the claim limitations of claim 1. This rejection should be withdrawn.

As to claims 19-23, these claims relate to the use of backing plate materials to be used in a sputtering assembly. The backing plate comprises a valve metal, cobalt, titanium, or alloys thereof. Buehler only teaches the use of conventional materials for the backing plate such as copper. See Buehler, col. 3, line 15. Nakamori et al. also does not teach the use of a valve metal, cobalt, titanium, or alloys thereof as a backing plate material. Therefore, Buehler and Nakamori et al. do not describe the use of a valve metal, cobalt, titanium, or alloys thereof as backing plate materials and these claims are also allowable over the asserted references. This rejection should be withdrawn.

At page 6 of the Office Action, claim 9 is rejected under 35 U.S.C. §103(a) as being unpatentable over Buehler (U.S. Patent No. 6,503,380 B1) in view of Nakamori et al. (U.S. Patent No. 4,849,605) as applied to claim 7 above, and further in view of Sawada et al. (U.S.

U.S. Patent Application No. 10/621,096
Amendment dated June 21, 2005
Reply to Office Action of March 21, 2005

Patent No. 5,772,860). The Examiner asserts that while Buehler in view of Nakamori et al. as applied to claim 7 above does not teach a target to be partially recrystallized, Sawada et al. teaches a sputtering target of titanium with controlled crystal characteristics, including a recrystallization structure. The Examiner concludes that it would be obvious to modify Buehler in view of Nakamori et al., to use a recrystallized titanium. For the following reasons, this rejection is respectfully traversed.

As discussed above, Buehler in view of Nakamori et al. do not teach or suggest a "monolithic sputtering target assembly." The above comments apply equally here. That is, Buehler in view of Nakamori et al. do not teach all of the claim limitations of claim 1. Sawada et al. does not teach a monolithic sputtering target assembly either. Sawada et al. only shows a conventional assembly. Additionally, Sawada et al. only mentions titanium. Since the asserted references do not teach all of the claim limitations of claim 9, it is respectfully suggested that this rejection be withdrawn.

At page 7 of the Office Action, claims 1, 4, 7, 8, 10, 11, 19, 20, and 24 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Buehler (U.S. Patent No. 6,503,380 B1) in view of Moslehi (U.S. Patent No. 6,197,166). The Examiner asserts that Buehler does not teach the metal as cobalt, and that Moslehi teaches that cobalt is a metal that can be sputtered. The Examiner then asserts that it would be obvious to modify the sputtering assembly of Buehler to utilize cobalt as the target and backing plate. For the following reasons, this rejection is respectfully traversed.

As discussed above, Buehler does not teach a "monolithic sputtering assembly." The comments above apply equally here. Moslehi does not overcome the deficiencies of Buehler since Moslehi relates to conventional systems for physical vapor depositions using conventional

U.S. Patent Application No. 10/621,096
Amendment dated June 21, 2005
Reply to Office Action of March 21, 2005

sputtering target materials. There is no teaching or suggestion in this reference of a monolithic target assembly. The Examiner asserts that it would be obvious to use cobalt as the target and backing plate material, however, Buehler does not at all teach or suggest using the same material for target and backing plate portions. As discussed above, Buehler only shows target blanks attached to different backing plate materials and does not teach a monolithic assembly that has a backing plate portion and a target portion of the same material. Moslehi does not overcome these deficiencies and merely shows conventional target materials, but not once mentions monolithic assemblies or the use of the same material for the backing plate and target portions. Accordingly, this part of the rejection should be withdrawn.

As to claims 19, 20, and 24, neither Buehler nor Moslehi teach the use of cobalt as a backing plate let alone a valve metal, titanium, or an alloy thereof. Buehler recites the use of conventional metals as backing plates, such as copper. Moslehi teaches that cobalt is a conductive metal that can be sputtered. This is the target material, not the backing plate material. There is no teaching, suggestion, or hint, of the use of cobalt, titanium, a valve metal, or an alloy thereof as a backing plate as recited in claim 19 in either of the asserted references. The Examiner has not shown in any of the cited references why one skilled in the art would be motivated to use these target materials for the backing plate. Not a single reference teaches or suggests such a re-arrangement of materials. It is respectfully suggested that claims 19, 20, and 24 are clearly allowable and that this rejection should be withdrawn.

At page 7 of the Office Action, claim 9 has been rejected as unpatentable over Buehler (U.S. Patent No. 6,503,380 B1) in view of Moslehi (U.S. Patent No. 6,197,166) as applied to claim 7 above, and further in view of Sawada et al. (U.S. Patent No. 5,772,860). The Examiner states that Buehler in view of Moslehi does not teach the target to be partially recrystallized. The

U.S. Patent Application No. 10/621,096
Amendment dated June 21, 2005
Reply to Office Action of March 21, 2005

Examiner states that Sawada et al. teaches a sputtering target of titanium, including a recrystallization structure. For the following reasons, this rejection is respectfully traversed.

The comments set forth above regarding each of these references apply equally here to this combination. As discussed above, none of the asserted references teach a "monolithic sputtering assembly" and hence claim 9 is allowable over all of the art of record in this case. As discussed above, Sawada et al. relates to conventional titanium sputtering targets and does not teach or suggest monolithic assemblies and, therefore, does not overcome the deficiencies of Buehler or Moslehi. This rejection should be withdrawn.

At page 8 of the Office Action, claims 25-28 and 34-36 are rejected under 35 U.S.C. §103(a) as being unpatentable over Aimone et al. (U.S. Patent Appl. Publication No. 2002/00112955) in view of Dunlop et al. (U.S. Patent No. 5,809,393). The Examiner asserts that Aimone et al. teaches a method of recycling a refractory metal target, but that Aimone et al. does not describe the target to be a monolithic target. The Examiner then asserts that it would be obvious to modify the method of Aimone to recycle the sputtering targets of Dunlop et al.

As discussed above, Dunlop et al. does not teach monolithic sputtering target assemblies as recited in claim 1. Dunlop et al. only teaches sputtering targets by themselves, which targets are intended to be used in various sputtering assemblies and apparatus that are known in the art. Therefore, the combination of Dunlop et al. and Aimone et al. does not teach all of the elements of claim 25 and the claims dependent thereon.

With regard to claims 34-36, all of these claims ultimately depend upon claim 1, and since neither Aimone et al. nor Dunlop et al. teach the recycling of a monolithic sputtering target assembly as discussed above, these claims are allowable over the combination of Aimone et al. and Dunlop et al. as well. As discussed above, Dunlop et al. does not teach or suggest

U.S. Patent Application No. 10/621,096
Amendment dated June 21, 2005
Reply to Office Action of March 21, 2005

monolithic target assemblies and, as apparently recognized by the Examiner, Aimone et al. does not relate to monolithic target assemblies. It is respectfully requested that this rejection be withdrawn.

At page 9 of the Office Action, claims 25-28, 32, and 34-36 are rejected under 35 U.S.C. §103(a) as unpatentable over Aimone et al. (U.S. Patent Appl. Publication No. 2002/00112955 A1) in view of Buehler (U.S. Patent No. 6,503,380 B1) and Nakamori et al. (U.S. Patent No. 4,849,605). The Examiner asserts that it would have been obvious to modify the invention of Aimone et al. to recycle the tantalum targets of Buehler when combined with Nakamori et al.

As discussed above, Buehler does not teach a monolithic sputtering target assembly as recited in claim 1. The comments above with respect to Buehler, Aimone et al., and Nakamori et al. apply equally here. As stated above, none of these references teaches or suggests a monolithic sputter assembly as recited in claim 1. Furthermore, with respect to the claims dependent on claim 19, as indicated above, none of the cited references teaches or suggests the specific backing materials recited in claim 19, namely valve metal, cobalt, titanium, or alloys thereof. The Examiner has simply not shown that any of these references alone or combined would teach one to use this specific backing material. There clearly is no suggestion in the cited art to use the material as the backing plate material. It is respectfully requested that this rejection be withdrawn.

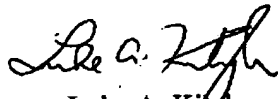
At page 10 of the Office Action, claims 37 and 38 have been found by the Examiner to contain allowable subject matter.

While the applicants appreciate that the Examiner has found the subject matter of these claims allowable, the applicants believe that all of the claims are allowable over the references cited in the Office Action.

U.S. Patent Application No. 10/621,096
Amendment dated June 21, 2005
Reply to Office Action of March 21, 2005

If there are any fees due in connection with the filing of this response, please charge the fees to Deposit Account No. 03-0060. If a fee is required for an extension of time under 37 C.F.R. §1.136 not accounted for above, such extension is requested and should also be charged to our Deposit Account.

Respectfully submitted,



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